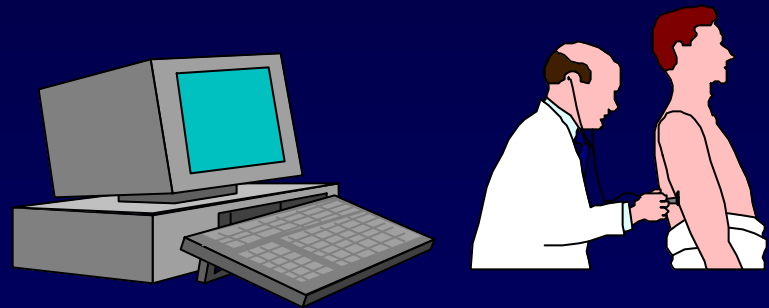
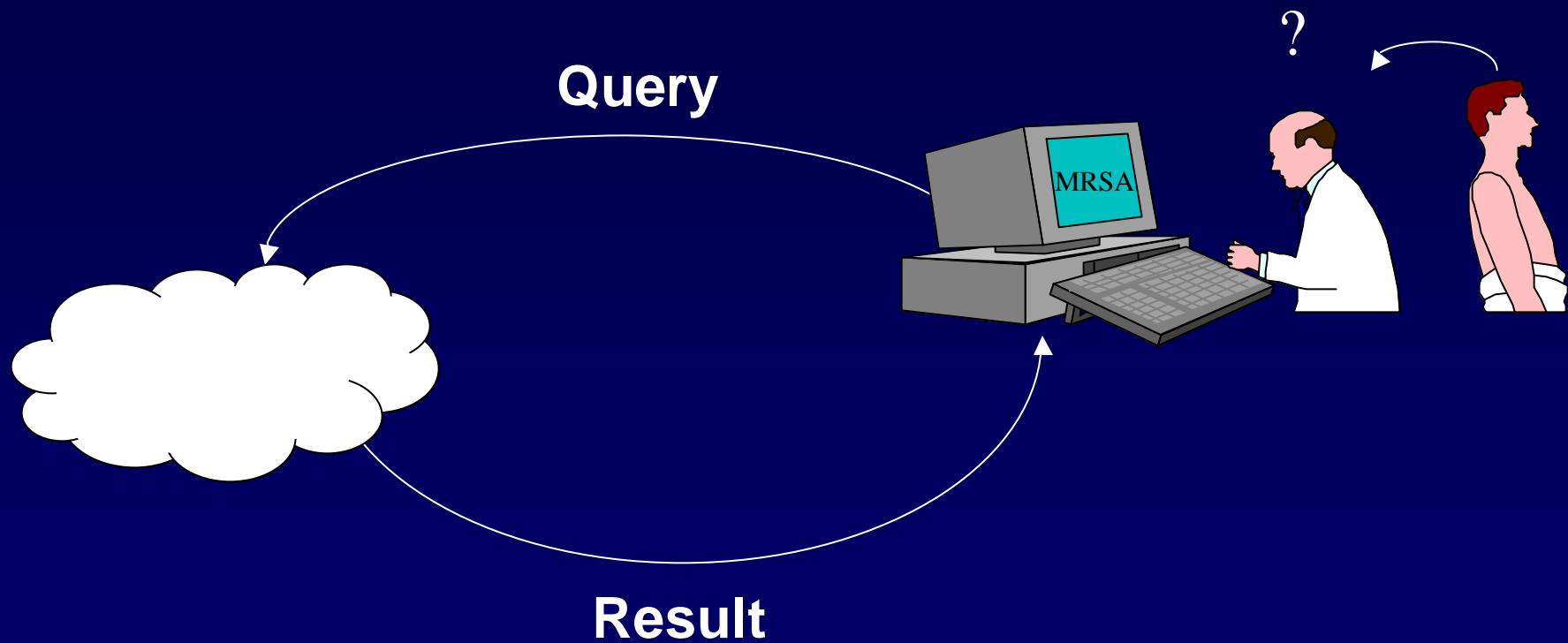


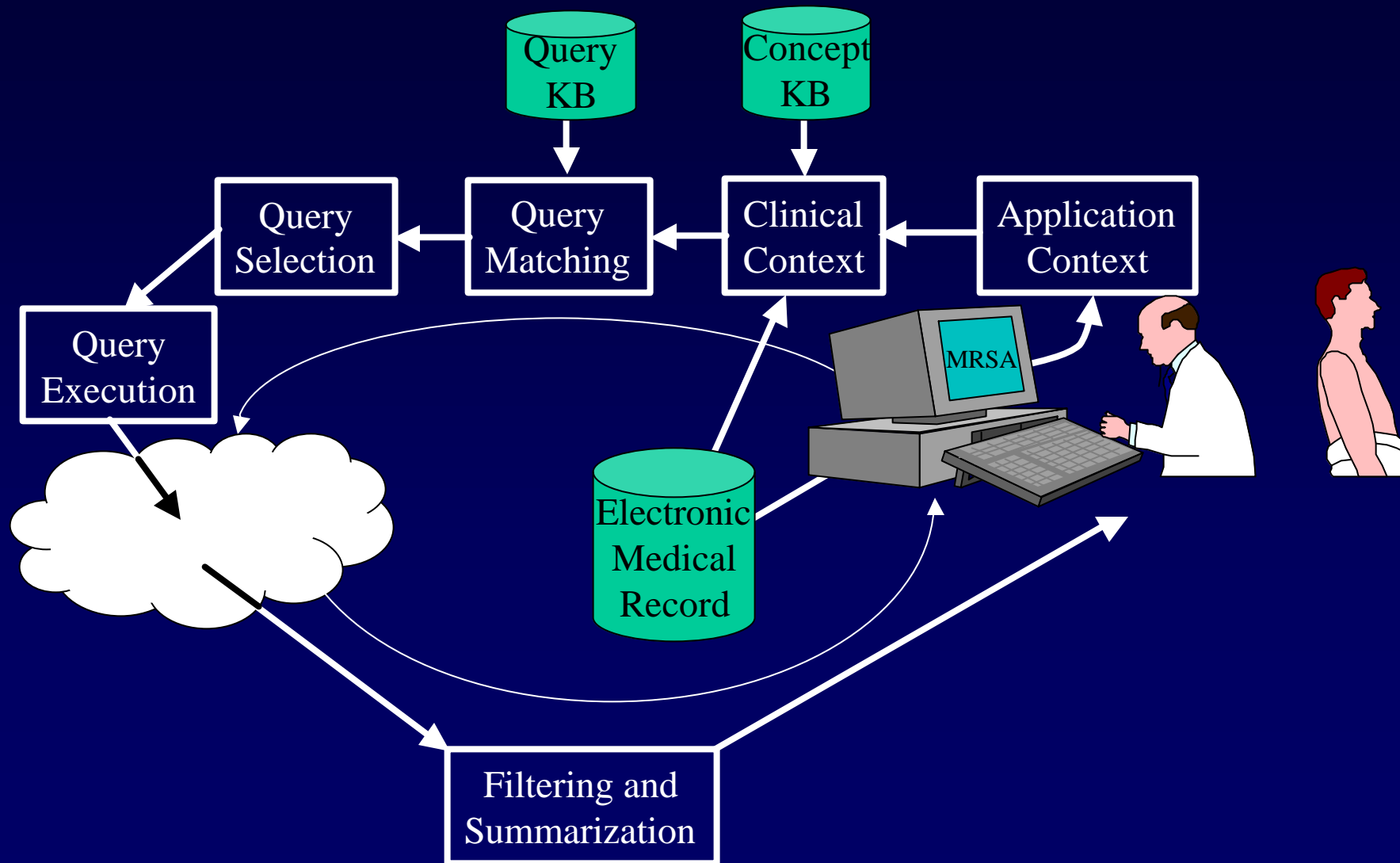
Decision Support



Decision Support



Intelligent Decision Support



Components

- Extraction of application context
- Knowledge base for clinical context
- Extraction of clinical context
- Knowledge base of generic queries
- Matching algorithm and engine
- Instantiation and presentation to user

Conceptual Graphs

Concept ? (relation) ? Concept

Application Context

Culture, Routine Catheterized ? (assesses_effect_of) ?
IMIPENEM ? (disrupts) ?
Physiologic Function ? (process_of) ?
E. Coli ? (property_of) ?
Antibiotic Sensitivity

Laboratory Procedure ? (assesses_effect_of) ?
Antibiotic ? (disrupts) ?
Physiologic Function ? (process_of) ?
Organism ? (property_of) ?
Organism Attribute

Application Context in XML

```
<appContext appID="DemoCIS" depID="Microbiology">
<clinEventGraph>
  <conceptGroup semType="Laboratory Procedure" conGroupID="cgi1">
    <conceptSet conSetID="csi1">
      <concept conString="CPMC Battery: Culture, Routine Catheterized"
        conContextWeight="0.6"/>
    </conceptSet>
  </conceptGroup>
  <conceptGroup semType="Antibiotic" conGroupID="cgi2">
    <conceptSet conSetID="csi2"> <concept conString="IMIPENEM"
      conContextWeight="0.6"/>
    </conceptSet>
  </conceptGroup>
  <conceptGroup semType="Physiologic Function" conGroupID="cgi3">
    <conceptSet conSetID="csi3">
      </conceptSet>
    </conceptGroup>
  </conceptGroup>
</clinEventGraph>
</appContext>
```

Knowledge Base for Clinical Context

- Medline co-occurrence of MeSH terms
- Identify important co-occurring semantic types
- Knowledge base of specific co-occurring concepts

Clinical Context Knowledge Base

Organic Chemical ? (interacts with) ? Pharmacologic Substance

Ketoconazole ? (interacts with) ? Mifepristone

Disease or Syndrome ? (co-occurs with) ? Disease or Syndrome

Hypertension ? (co-occurs with) ? Proteinuria

Neuroreactive Substance or Biogenic Amine ? (disrupts) ? Organ or
Tissue Function

Dopamine ? (disrupts) ? Natriuresis

Clinical Context

Laboratory Test: Glucose? (measures) ?
glucose? (result_of) ? hyperglycemia

Laboratory Procedure? (measures) ?
Biologically Active Substance? (result_of)
? Finding

Knowledge Base of Generic Queries

- "Madlib" questions: "How do I treat <Disease>?"
- Evidence-Based Medicine conceptual framework
- Multiple sources of example questions
- Express relationships among concepts
- UMLS semantic types as place holders

Generic Query Knowledge Base

Pharmacologic Substance ? (treats) ?
Organism ? (causes) ? Pathologic Function

Generic Queries Matching Algorithm

- Each query graphs is decomposed into subgraphs
- Subgraphs matched to application context
- Exact matches vs distant matches
- Similarity based on average score of all subgraphs

Query Context

Pharmacologic Substance

{one of: IMIPENEM, CEFOXITIN, AMPICILLIN}

? (interacts_with) ?

Pharmacologic Substance

{one of: IMIPENEM, CEFOXITIN, AMPICILLIN}

User Interface

- Selection of query (ranking)
- Selection of concepts (instantiation)



Back



Forward



Reload



Home



Search



Netscape



Print



Security



Shop



Stop



Percival Digital Library

Please select your choice(s) from the following questions by combining the elements in the lists and/or type a keyword in the textfields of each question.

1. Is it OK to use with ?

2. What are the absorption characteristics of ?

3. How do the pharmacodynamic characteristics of compare ?

Percival Digital Library

Please select your choice(s) from the following questions by combining the elements in the lists and/or type a keyword in the textfields of each question.

1. Is it OK to use with ?

Go

2. What are the absorption characteristics of

Go

3. How do the pharmacodynamic characteristics of

Go

select one in the list
 PIPERCILLIN/TAZOBACTAM
 CIPROFLOXACIN
 AMPICILLIN
 IMIPENEM
 CEFTAZIDIME
 CEFOTAXIME
 TICARCILLIN/CLAVU
 CEFOXITIN
 CEFAZOLIN
 PIPERACILLIN
 TRIMETH/SULFAMETHOX

compare ?

Output of User Interface

Pharmacologic Substance {AMPICILLIN}

? (interacts_with) ?

Pharmacologic Substance {IMIPENEM}

Next Steps

- Linking to the downstream process
- Integration with the presentation environment
- Evaluation
 - Knowledge extraction from the medical record
 - Appropriate queries
 - Query ranking
 - User interface
 - Improved retrievals